WHAT IS CLAIMED IS:

1. An optical device comprising:

an optical cavity;

an optical gain medium that generates light in said optical cavity; and

an aberration-corrected focusing diffractive optical element optically coupled to said optical gain medium to receive said light from said optical gain medium, said aberration-corrected focusing diffractive optical element being configured to diffractively focus said light of a selected wavelength back onto said optical gain medium to cause said light of said selected wavelength to resonate within said optical cavity.

2. The optical device of claim 1 wherein said aberration-corrected focusing diffractive optical element is configured to correct effects of spherical aberration.

3. The optical device of claim 2 wherein said aberration-corrected focusing diffractive optical element includes circular gratings separated by radius-dependent periodicities, said periodicities being based on an aspheric diffractive surface to compensate for deviations in angles of diffraction due to said spherical aberration.

4. The optical device of claim 3 wherein said circular gratings of said aberration-corrected focusing diffractive optical element have a profile selected from a sinusoidal profile, a rectangular profile, a triangular profile and a sawtooth profile.

5. The optical device of claim 1 further comprising a reflective element optically coupled to said aberration-corrected focusing diffractive optical element to reflect at least some of said light from said aberration-corrected focusing diffractive optical element to said optical gain medium.

6. The optical device of claim 5 wherein said aberration-corrected focusing diffractive optical element is transmissive.

7. The optical device of claim 6 wherein said aberration-corrected focusing diffractive optical element is positioned between said optical gain medium and said reflective element.

8. The optical device of claim 5 wherein said aberration-corrected focusing diffractive optical element is reflective.

9. The optical device of claim 8 wherein said optical gain medium is positioned between said reflective element and said aberration-corrected focusing diffractive optical element.

10. A method for selectively emitting light, said method comprising:

generating light;

reflecting said light within an optical cavity;

wavelength selectively diffracting said light within said optical cavity so that said light of a selected wavelength is resonant within said optical cavity, including correcting effects of an aberration related to said diffracting; and

emitting said light of said selected wavelength from said optical cavity as output light.

11. The method of claim 10 wherein said correcting includes correcting effects of spherical aberration related to said diffracting.

12. The method of claim 11 wherein said correcting includes compensating for deviations in angles of diffraction due to said spherical aberration using circular gratings separated by radius-dependent periodicities, said periodicities being based on an aspheric diffractive surface.

13. The method of claim 10 wherein said wavelength selectively diffracting includes transmitting said light within said optical cavity.

14. The method of claim 10 wherein said wavelength selectively diffracting includes reflecting said light within said optical cavity.

15. An optical device comprising:

a light source operable to generate light;

an aberration-corrected diffractive optical element configured to diffractively focus said light of a selected wavelength back onto said light source; and

means for reflecting at least some of said light from said focusing means to said light source, said reflecting means partially defining an optical cavity resonant at said light of said selected wavelength.

16. The optical device of claim 15 wherein said aberration-corrected diffractive optical element is configured to correct effects of spherical aberration.

17. The optical device of claim 16 wherein said aberration-corrected diffractive optical element includes circular gratings separated by radius-dependent periodicities, said periodicities being based on an aspheric diffractive surface to compensate for deviations in angles of diffraction due to said spherical aberration.

18. The optical device of claim 17 wherein said circular gratings of said aberration-corrected diffractive optical element have a profile selected from a sinusoidal profile, a rectangular profile, a triangular profile and a sawtooth profile.

19. The optical device of claim 17 wherein said aberration-corrected diffractive optical element is positioned between said light source and said reflecting means, said aberration-corrected diffractive optical element being transmissive.

20. The optical device of claim 15 wherein said light source is positioned between said aberration-corrected diffractive optical element and said reflecting means, said aberration-corrected diffractive optical element being reflective.